Hmk Take up

ques 12. p 44

3 sided

L	W	Perimeter	Area
30	4		
15	8		
17.1	7		
16	7.5		

$120 m^2$

[7.75, 15.5]

$A = l \times w$

$\frac{A}{w} = l$

$\frac{120}{4} = l \rightarrow 30$

$\frac{120}{8} = l \rightarrow 15$

$\frac{120}{7} = l = 17.1$

$\frac{120}{7.5} = l = 16$

Feb 14-9:38 AM

Map 4C
Optimize Volume & Surface Area
1.6 p. 54 - 63

What is the maximum volume of a square based prism given a surface area of 40 m^2 ?

Length	Width	Surface Area	Volume
2.58	2.58	40	$17.17 m^3$
		40	
		40	
		40	
		40	
		40	
		40	

P= l+l+w+w

A= L x W

$6s^2 = 40$

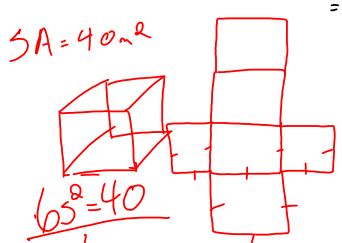
$s^2 = 40/6$

$s^2 = 6.6$

$s = 2.57 m$

$V = s^3$

$V = A_B \times h^T$
$= 6.6 \times 2.57$
$= 16.96 m^3$



$SA = 40 m^2$

$6s^2 = 40$

$\frac{6}{6}$

$\sqrt{s^2} = \sqrt{6.66}$

$s = 2.581$

$V = A = B_A \times h$
$= 2.58 \times 2.58$
$= 17.17 m^3$

Feb 7-7:18 AM

Map 4C
Optimize Volume & Surface Area
1.6 p. 54 - 63

What is the maximum volume of a square based prism given a surface area of 40 m^2 ?

x6

Length	Width	Surface Area	Volume
2.5	2.5	37.5	
2.6	2.6	40.56	17.5 ~ 7
2.55x2.55			

P= l+l+w+w

A= L x W

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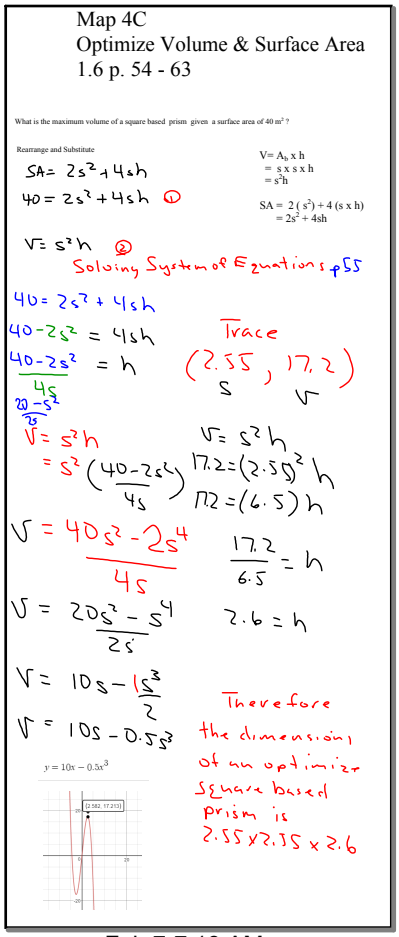


Map 4C
Optimize Volume & Surface Area
1.6 p. 54 - 63

What is the maximum volume of a square based prism given a surface area of 40 m^2 ?

Rearrange and Substitute

$SA = 2s^2 + 4sh$

$40 = 2s^2 + 4sh$ ①

$V = s^2h$ ②

$V = A_b \times h$
$= s \times s \times h$
$= s^2h$

$SA = 2(s^2) + 4(s \times h)$
$= 2s^2 + 4sh$

Solving System of Equations p55

$40 = 2s^2 + 4sh$

$40 - 2s^2 = 4sh$

$\frac{40-2s^2}{4s} = h$

$\frac{20-s^2}{2s} = h$

$V = s^2h$

$= s^2\left(\frac{40-2s^2}{4s}\right)$

$V = \frac{40s^2 - 2s^4}{4s}$

$V = \frac{20s^2 - s^4}{2s}$

$V = 10s - \frac{1}{2}s^3$

$V = 10s - 0.5s^3$

Trace

(2.55, 17.2)
s V

$V = s^2h$

$17.2 = (2.55)^2 h$

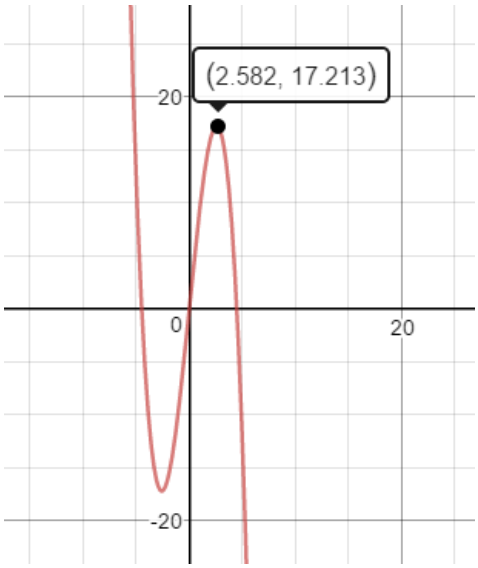
$17.2 = (6.5)h$

$\frac{17.2}{6.5} = h$

$2.6 = h$

Therefore the dimensions of an optimized square based prism is 2.55 x 2.55 x 2.6

Feb 7-7:18 AM



Sep 14-12:17 PM

$y = 10x - 0.5x^3$

Sep 14-12:17 PM

Key Concepts

- The minimum SA for a given volume of a square based rectangular prism occurs when the height is equal to the side length of the base
- The minimum SA for a given volume of a cylinder occurs when the height is equal to the diameter
- Systems can be solved using algebraic and technologic solutions

Hmk. p61 -63 q. 3,6 &7

Cube =

$V_{opt} = s^3$

$SA_{opt} = 6s^2$

Cyl

$V_{opt} = \pi r^2 \times 2r$

$= 2\pi r^3$

$SA_{opt} = 2\pi r^2 + \pi d h$

$= 2\pi r^2 + \pi(2r)(2r)$

$= 2\pi r^2 + 4\pi r^2$

$SA_{opt} = 6\pi r^2$

Feb 7-7:27 AM

$V = s^3$

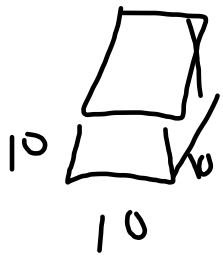
$SA = 6s^2$

$V = 1000\ m^3$

$1000 = s^3$

$\sqrt[3]{1000} = s$

$10 = s$



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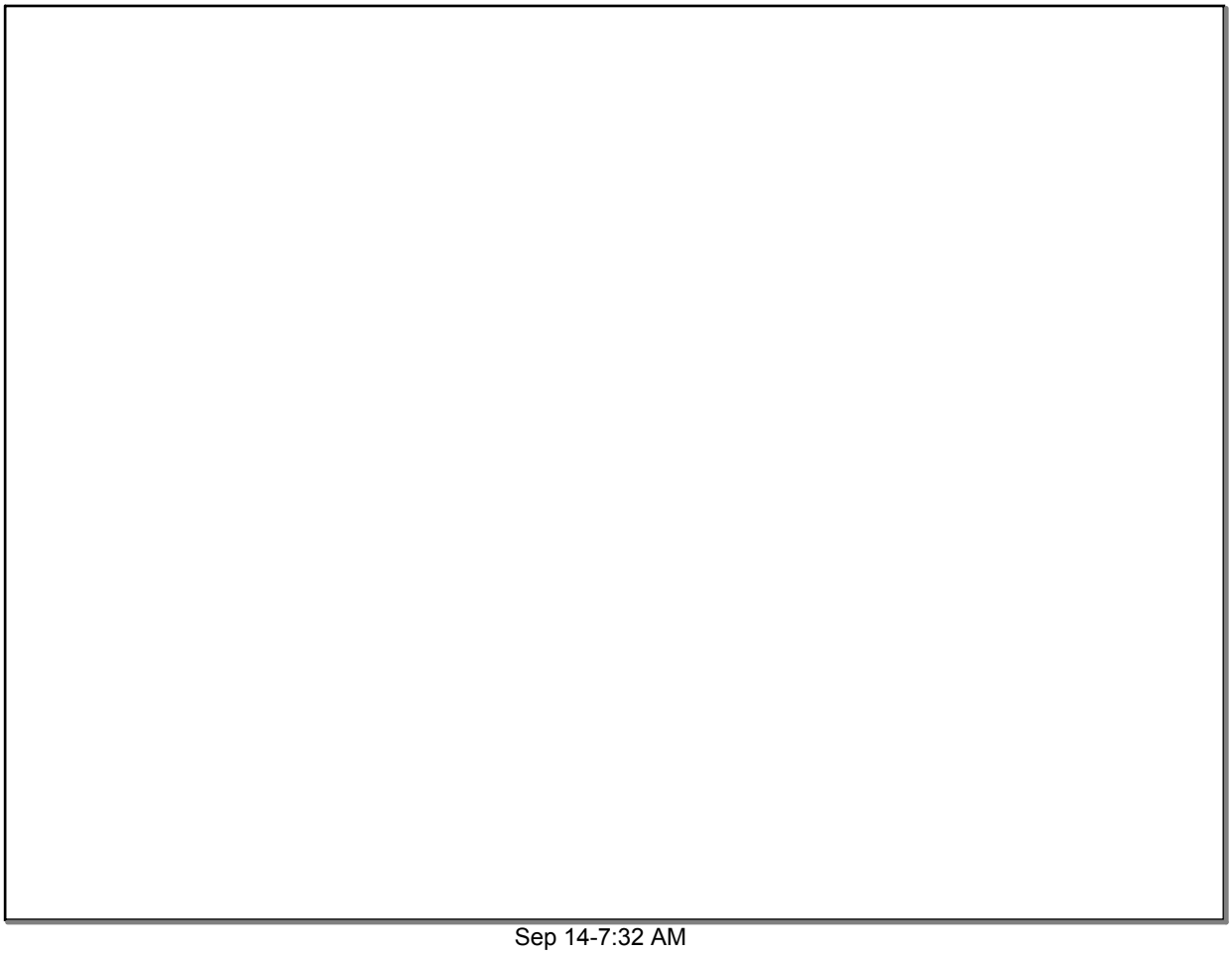

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